thus depends only on whether the U.S. and the Soviet Union want this to happen, and not on technical difficulties which stand in the way of an agreed and controlled *elimination* of existing weapons.

What causes Leghorn and Inglis to urge the "freezing" of the arms race at its penultimate stage, instead of letting it run to its completion—which Sherwin and Amster take for granted and consider desirable? Leghorn and Inglis believe that stopping at the present level of development of thermonuclear weapons and missiles will preserve a situation from which a movement back toward real disarmament remains possible, if and when international relations will have improved enough to make extensive international control and inspection feasible. Permitting the race to run to its conclusion—when well-protected, dispersed, invulnerable bases, stacked with abundant thermonuclear missiles, actually exist in both camps—will mean, according to Leghorn and Inglis, going beyond a point of no return. They suggest that it is in the self-interest of both the U.S. and the Soviet Union to keep the possibility of future controlled disarmament open. Furthermore, they argue, only such a freeze can prevent nations not now in the van of the arms race from acquiring weapons of mass destruction. The acquisition of atomic weapons by smaller powers is bound to create a multilateral danger, less predictable and less controllable than the present danger of the outbreak of atomic war by one of the two armed camps.

Colonel Leghorn emphasizes the extreme urgency of the situation. He believes that the suggested attempt to stop the race will have to be made within the next few months—otherwise, it will be too late, technological progress having put the mastery of the ultimate terror weapons irrevocably in the hands of man.

The suggestion of Leghorn and Inglis is not a propaganda proposal to shift the blame for the arms race to the other side. It is deeply serious. Their belief that we are now offered literally the last opportunity to avoid an irrevocable deadlock of mutual terror is a sober estimate of reality, and not an exaggeration to whip up support for a pet disarmament plan. It is, in fact, *now* or *never*.

There is a tendency in America to believe that to stop the development of advanced technological weapons, even on a truly reciprocal basis, would, on the balance, damage the U.S. and favor the Soviet Union. It has been so often stated that the military strength of America lies in its technological leadership, while that of Russia resides in its inexhaustible manpower, that this is accepted as permanent. Undoubtedly, it has been largely valid in the past. The Russians themselves have traditionally thought along the same lines. However, the situation is changing. Ever since 1945, atomic scientists (and the *Bulletin*, in particular) have pointed out that *in the long run*, the existence of atomic weapons will bring more advantages to the Soviet Union than to America, because of the greater vulnerability of the American industrial economy; and the greater usefulness of a weapon of political blackmail in peace and of sudden mass destruction in war to a totalitarian dictatorship, than to a democracy restrained by public opinion. The rapid advance of Soviet atomic technology and military aviation is about to make this long-range prediction come true. The Soviet leaders have now realized the change, and have made it clear in their characteristic blunt and crude way. They have abandoned their insistence on the "outlawing" of atomic weapons as the first step in disarmament. In Zhukov's and Khrushchev's speeches at Moscow and London, threats of atomic destruction visited on American cities have replaced previous predictions of the dire fate in store for invaders of the Russian homeland.

While the Soviet leaders seem finally to have grasped the full advantages for them of the uncontrolled possession of atomic and thermonuclear weapons, American public opinion shows itself slow—and understandably reluctant—to acknowledge this new relationship.

At the time when the Soviet Union and the U.S. are approaching a balance of air-atomic destructive power, American public opinion still takes it for granted that a halt to the technological arms race will be a boon to the Soviet Union. This conviction is likely to cause the proposals of Leghorn and Inglis to be criticized, at best, as naive, and at worst, as deliberately aiming at the unilateral weakening of the U.S. In fact, however, these proposals are in the interest of the West: the question is whether they are also sufficiently in the interest of the Soviet Union to be acceptable to the latter. After all, stopping a race always benefits the one who happens to be ahead when the freeze is imposed, and not the one who is coming up from behind! (England, too, will not be happy about stopping her thermonuclear weapons development short of the testing of actual weapons.)

Of the arguments Leghorn and Inglis adduce to show the desirability of the freeze for both sides, perhaps the most convincing one is the predicament into which *both* major powers may be placed by the acquisition of atomic weapons by several other nations. The capacity of the two blocs to avoid the outbreak of a major war—as long as neither of them wants it—may then be badly crippled. Their hands could be forced by the irresponsible action of a "neutral," or a wilful ally.

It may be worthwhile pointing out here that the second part of the traditional comparison of the strength of the West and the East is also by no means unchallengeable. The juxtaposition of the "inexhaustible" Soviet reserves of military manpower and the limited manpower of the West always sounded exaggerated, when the 200 million population of the Soviet Union were contrasted with the 150 million population of the U.S., not to speak

of the approximately 30 million population of Western Europe. The ability of the Soviet Union to put into the field and keep continuously under arms two hundred infantry divisions has been the consequence, not of the size of its population, but of the character of its economy. With increased industrialization, it becomes as difficult for the Soviet Union to spare these people for military service as it has been traditionally the case for the United States or England. Soviet industrialization was made possible by a large-scale movement of people from the countryside to the city. The much slower mechanization of agriculture has led to a dearth of manpower for continued growth of industry, and has even caused a forced movement of some industrial population back to the farms. This is why the Soviet Union is now willing to talk about the reduction of military contingents, or even undertake it unilaterally—while she has lost interest in the abolition of air-atomic weapons. The possibility of atomic disarmament hinged decisively on effective controls. Slowly, realizing this, the Soviet Union has advanced, in the course of the U.N. negotiations on atomic energy control, to the point where she not only has conceded the principle of international inspection, but has agreed to give the international inspectors free entry into and egress from all countries, and access to all atomic energy plants. It can be anticipated that the willingness of the Soviet Union to make concessions on the subject of inspection will now not increase, but wane. Already, during the recent London meetings, her conditional acceptance of President Eisenhower's proposal for aerial inspection has been superceded by an outright rejection.

To sum up, the proposals of Leghorn and Inglis appear as the only now practically feasible "disarmament" (or, rather, arms "freezing") proposals in the field of atomic weapons, since they are enforceable without extensive inspection. Whether the Soviet Union still has real interest in the cessation of thermonuclear weapons tests—as she has again proclaimed on the occasion of the recently announced reduction of her army establishment remains for the West to explore. We urge that most serious consideration be given to this possibility.

Perhaps the Leghorn-Inglis ideas have already been weighed by government experts, and adjudged technically impossible, or as coming too late to substantially affect the arms race. If this is the case, the world should be apprized of the decision and of the reasons for it.

Ten years ago, America took an imaginative lead in the atomic disarmament plans with the so-called Acheson-Lilienthal report. It was released for public discussion before it was officially presented to the U.N. This was in keeping with the American tradition of permitting public opinion to take part in policy formation, and was a wise thing from the point of view of gaining wide understanding for American atomic policies.

Since then, secrecy has increasingly blighted American policy-forming processes. In 1952, a committee was appointed, including Allen W. Dulles, Vannevar Bush, J. R. Oppenheimer, John Dickey, and Joseph E. Johnson, to advise the State Department on disarmament. Rumors had it that its advice was to explore the possibility of agreement with the USSR on renunciation of thermonuclear weapons tests (it was still time then to stop the arms race short of perfection of these weapons). Whether these rumors were true, we do not know, since no official word was ever heard on the subject. More recently, Mr. Stassen appointed, among several advisory panels, one headed by Professor E. O. Lawrence to advise him on scientific and technological aspects of the disarmament problem. We hear no word about the report of this panel. Granted that it probably contains secret data, these could be eliminated, and public opinion given a declassified summary sufficient for intelligent discussion of the technical aspects of the disarmament situation, and critical appraisal of American policies in this field. Instead, all the public is considered fit to receive, are vague optimistic pronouncements by Mr. Stassen.

—E. R.

The three articles which follow continue the discussion of science and military strategy which began in our May issue. Again, scientists as well as military experts give their views. Richard Leghorn is a retired Air Force Colonel now with Eastman Kodak Co. David Inglis is a Senior Physicist at Argonne National Laboratory. Colonel Pierre Callois is a military strategist attached to the staff of NATO.

Pierre Auger's article, "Science as a Force for Unity Among Men," on page 208, introduces a new section of the Tenth Anniversary Symposium discussing the social responsibility of science and scientists. Dr. Auger is Director of the Natural Sciences Department of Unesco. This series will be continued in the September issue with contributions from scientists in other countries. We hope that the subject will stimulate the interest and participation of many other scientists, since we think it the central problem facing science as a profession in our times.